Developing Principles for Effective Human Collaboration with Free-Flying Robots

Completed Technology Project (2016 - 2019)

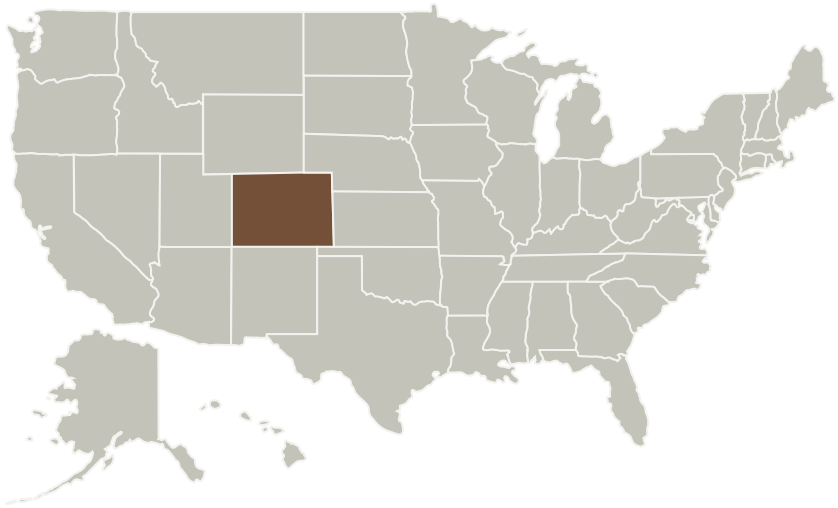
Project Introduction

Aerial robots hold great promise in supporting human activities during space missions and terrestrial operations. For example, free-flying robots may automate environmental data collection, serve as maneuverable remote monitoring platforms, and effectively explore and map new environments. Such activities will depend on seamless integration of human-robot systems. The objective of this research is to advance fundamental knowledge of human-robot interaction (HRI) principles for aerial robots by developing new methods for communicating robot status at a glance as well as robot interface technologies that support both proximal and distal operation. This work will design a signaling module that maps robot communicative goals to signaling mechanisms, which can be used in robot software architectures in a manner analogous to common robot motion planning modules. Additionally, this work will examine how robot interface design requirements differ for crew and ground control and develop techniques for scaling control systems across interaction distances.

Anticipated Benefits

This research will advance fundamental knowledge of human-robot interaction (HRI) principles for aerial robots by developing new methods for communicating robot status at a glance as well as robot interface technologies that support both proximal and distal operation.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
University of Colorado Boulder	Lead Organization	Academia	Boulder, Colorado

Primary U.S. Work Locations
Colorado

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

University of Colorado Boulder

Responsible Program:

Space Technology Research Grants

Project Management

Program Director:

Claudia M Meyer

Program Manager:

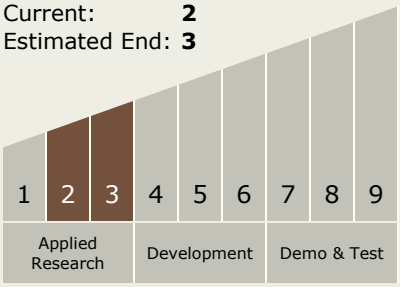
Hung D Nguyen

Principal Investigator:

Daniel Szafir

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **3**



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Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.4 Human-Robot Interaction
    - TX04.4.2 Distributed Collaboration and Coordination

Target Destinations

Earth, Foundational Knowledge